



**DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751**

June 20, 2019

NOAA's National Marine Fisheries Service Protected
Resources Division
55 Great Republic Drive
Gloucester, Massachusetts, 01930

Attn: Dr. Michael J. Asaro

Re: NAE-2019-01306 – John Wescott – Oyster and Kelp Farm – East Passage of Narragansett Bay, Rhode Island

Dr. Asaro,

We have received a permit application for the proposed activity as described below. This letter is to request Endangered Species Act (ESA) concurrence from your office for Mr. Wescott's project. We have made the determination that the proposed activity may affect, but is not likely to adversely affect, any species listed as threatened or endangered by NMFS under the ESA of 1973, as amended. Our supporting analysis is provided below.

Proposed Project

The purpose of the project is to cultivate *Crassostrea virginica* (Atlantic Oysters) and *Saccharina latissimi* (Sugar Kelp). The work to cultivate oysters will be accomplished in a 3 acre site and contains 20 ¾" sinking poly-dacron trawl lines set, north to south, that are 100' long and spaced 15' apart which will be utilizing bottom cages. The trawl lines will be attached at each end to a lobster buoys. The trawl lines will hold 15 cages (46" x 36" 24") per line. The average water depth of the lease area is at 20' at mean low water and 22' at mean high water on the western side of the lease, and 7' low tide to 11' feet high at high tide on the eastern side of the lease. The Oyster harvesting season will run from April to November, at the end of the season the cages will rest on the bottom, and all gear will stay in year round.

The work to cultivate Sugar Kelp will take place on the same 3 acre site will contain 10 (1/2") long lines set north to south that are 100' long spaced 25' apart. The Sugar Kelp lines will be separate from oyster trawl lines. Each line will have three 24" round white buoys and eight 12" black buoys and on the ends be held in place by a 5' mushroom anchor. There will be 5' between the top of the buoy and the long line which holds the Kelp. The average water depth of the lease area is at 20' at mean low water and 22' at mean high water on the western side of the lease, and 7' low tide to 11' feet high at high tide on the eastern side of the lease. The Kelp season will run from November 1'st to April 30'th, and the lines will be removed after the season is over. Safe boating markers that are 12" diameter with 360 degrees exposure around the buoy will be placed in all four corners that will have the CRMC # and name of applicant. In sum there will be 20 horizontal lines and 50

vertical (20 for the trawl lines and 30 for the long lines).

The initial gear oyster gear will be set in early July, which includes setting the anchors, buoys and hazard markers, the trawl lines and the cages will be set after the initial placement, the vessel will be a 20' – 25' skiff lobster boat with an outboard motor, which will also make routine maintenance and site inspections. The gear will be checked multiple times a week. Buoys will be added/removed as necessary to ensure proper buoyancy of the lines and tension for the kelp lines. The lifespan of the project will be as long as the project is profitable and the applicant is able to renew the lease, which would be 10 years unless extended.

While working on the site speeds will not exceed more than 10 knots. Travel to and from the farm site will be in designated channels between 10 and 15 knots. The approximate route will be 8 miles round trip originating in Bristol Harbor to the site.

Lease Coordinates	
NE: 41.612166°N	-71.273838°W
NW: 41.612182°N	-71.275061°W
SE: 41.611059°N	-72.273881°W
SW: 41.611011°N	-71.275039°W

Proposed Special Conditions:

1. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.
2. All gear, including buoys, must be marked with the permit number, as well as, the permittee's name and contact information. Markings shall be in a manner that will stand up to the elements over time.
3. Each sighting of a federally listed threatened or endangered whale, turtle, or fish shall be recorded and the following information shall be provided:
 - a. Date, time, coordinates of vessel
 - b. Visibility, weather, sea state
 - c. Vector of sighting (distance, bearing)
 - d. Duration of sighting
 - e. Species and number of animals
 - f. Observed behaviors (feeding, diving, breaching, etc.)
 - g. Description of interaction with aquaculture facility
 - h.
4. Copies of all survey forms and a summary report shall be provided to the Corps on a quarterly basis for the duration of the project. Based on the first years' experience, the Corps will review this requirement and direct future monitoring and reporting as appropriate. Except where stated otherwise, reports, drawings, correspondence, and any other submittals to the Corps required by this permit shall be

marked with the words “NAE-2019-01306” and shall be addressed to “Taylor Bell, Regulatory Division, U.S. Army Corps of Engineers, 696 Virginia Road, Concord, MA 01742-2751” or taylor.m.bell@usace.army.mil. Documents which are not marked and addressed in this manner may not reach their intended destination and do not comply with the requirements of this permit. Reports of sighted federally listed or endangered whales, turtles or fish shall be called in to 866-755-NOAA (6622).

5. The permittee shall maintain a reasonable buffer between sensitive marine resources such as sea turtles and whales. A reasonable buffer is interpreted to be at least 1500 ft. for Endangered Species Act (ESA)-listed right whales and 150 ft. for all other ESA-listed species.
6. If any listed species is observed to be entangled or otherwise interacting with the facility structure, permittee (or onboard staff) shall immediately contact the NOAA Stranding Hotline at 866-755-NOAA. Permittee should then contact NOAA Protected Resources Division, Gloucester, MA at (978) 281-9328.
7. The applicant will use equipment to ensure that constant tension is maintained on the line at all tides. The applicant will also utilize ropes that have a breaking strength between 10,000 – 12,000 pounds.
8. The gear sites shall be visited by an attendant surface vessel at least 3 times a week, site conditions permitting. Any noticeable difference in surface buoy or line tension such as any gaps in the horizontal line or movement of vertical lines will prompt an investigation into the tension of that line. If a problem is identified it will be corrected that day.

Description of the Action Area

The action area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50CFR§402.02). For this project, the Corps has determined the limits of the Federal undertaking and our associated “action area” for the John Wescott. The area includes the lease area captured within the table listed above from the ordinary high water to the depths of the trawl/long lines and the water column that separates the two at a water depth of 22’ at HTL and 9’ at HTL. Additionally, the vessel traffic routes that will be utilized by the applicant to maintain the structures within the project site are included in the action area which is approximately 8 miles in length. This area is expected to encompass all of the effects of the proposed project.

The substrate in the project area consist of sand, the salinity ranges from 24 to 32 parts per thousand (ppt). The water temperature ranges from 39°F in the winter to 70°F in the summer. There are no SAV or shellfish beds present in this area. This area is known to have aquaculture leases on it. To the south there are three mapped aquaculture leases within one mile, they are mapped on the State GIS page.

NMFS Listed Species (and Critical Habitat) in the Action Area

There are two species of whales, four species of sea turtles, and two species of fish listed under the Endangered Species Act (ESA) that occur or have the potential to occur in the action area and may be adversely affected by the proposed action. ESA species include:

Whales

North Atlantic Right Whale (*Eubalaena glacialis*) (73 FR 12024; Recovery plan: NMFS 2005)

Fin Whale (*Balaenoptera physalus*) (35 FR 18319; Recovery plan: NMFS 2010)

Sea Turtles

Kemp's Ridley Turtle (*Lepidochelys kempii*) (35 FR 18319; Recovery plan: NMFS et al. 2011)

Leatherback Turtle (*Dermochelys coriacea*) (35 FR 849; Recovery plan: NMFS & USFWS 1992)

Loggerhead Turtle (*Caretta caretta*) (76 FR 58868; Recovery plan: NMFS & USFWS 2008)

Green Turtle (*Chelonia mydas*) (81FR20057; Recovery plan: NMFS & USFWS 1991)

Fish

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) (77 FR 5880 and 77 FR 5914)

Shortnose Sturgeon (*Acipenser brevirostrum*) (32 FR 4001; Recovery plan: NMFS 1998)

Designated Critical Habitat

There is no designated critical habitat present in the action area for any of the ESA-listed species.

Whales

Two species of federally listed threatened or endangered whales may be found in coastal waters of New England including the action area year round. These species include the endangered North Atlantic right whale (*Eubalaena glacialis*), and the threatened fin whale (*Balaenoptera physalus*). Whales are generally distributed in coastal Atlantic waters from Florida to New England. The waters off of the New England coast (~40-50 meter depth contour) are mainly utilized by fin whales as foraging areas from March to August, with lower densities from September to November. Right whales forage in New England waters from January through October, with a large aggregation occurring in Cape Cod Bay from January through April. Increasing evidence suggests that coastal New England waters are utilized by right and fin whales as wintering grounds from November to January.

ESA listed whales could potentially occur in the action area during operation of the aquaculture site. However, we are not aware of any fin whale sightings in Narragansett Bay. In the past 15 years, no right whale sightings have been reported in the action, with the closest sightings (2) occurring off the coast off Newport, RI (~10 miles southeast) <https://www.nefsc.noaa.gov/psb/surveys/>.

Sea Turtles

Four species of federally listed threatened or endangered sea turtles may be seasonally found in coastal waters of New England including the action area. These species include the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*) and North Atlantic DPS of green (*Chelonia mydas*) sea turtles, as well as the endangered Kemp's ridley (*Lepidochelys kempii*) and leatherback (*Dermochelys coriacea*) sea turtles. Sea turtles are generally distributed in coastal Atlantic waters from Florida to New England. As water temperatures of coastal New England rise in the spring, turtles begin to migrate north from their overwintering waters in the south. Adult sea turtles are expected to be found in the action area foraging during the summer and fall months (May-November) when the water temperatures are at least 59° F (Shoop and Kenney 1992) with the highest concentrations of turtles from June through October (Morreale 1999; Morreale 2003; Morreale and Standora 2005). Sea turtle sightings in Narragansett Bay are rare, but do occur occasionally. According to opportunistic reported sighting data, of

the four species, leatherbacks and loggerheads are sighted most frequently, followed by Kemp's ridley and green sea turtles <http://seaturtlesightings.org/maps.html>.

Atlantic Sturgeon

There are four DPSs of Atlantic sturgeon listed as endangered (New York Bight, Chesapeake Bay, Carolina, and South Atlantic) and one DPS listed as threatened (Gulf of Maine) under the ESA. The marine range for all five DPSs includes marine waters, coastal bays, and estuaries from the Labrador Inlet in Labrador, Canada to Cape Canaveral, Florida. Available information on the distribution of Atlantic sturgeon indicates that a majority of the Atlantic sturgeon in the action area will be from the New York Bight (NYB) DPS with a small chance of Gulf of Maine, Chesapeake Bay, Carolina, and South Atlantic DPS individuals occurring in the action area (Damon-Randall *et al.* 2012). Although critical habitat has been proposed for the Atlantic sturgeon, the closest unit considered for such designation is the Connecticut River, this action will have no effect on any area proposed for federal critical habitat designation.

Atlantic sturgeon are bottom feeders that draw food into a ventrally located protrusible mouth (Bigelow and Schroeder 1953). The diet of adult and subadult Atlantic sturgeon includes mollusks, gastropods, amphipods, decapods, isopods, and fish (Bigelow and Schroeder 1953; ASSRT 2007; Guilbard *et al.* 2007; Savoy 2007). Atlantic sturgeon presence is strongly associated with the availability of prey, and as a result sturgeon may occur in any marine location where suitable forage and habitat are available. Multiple studies have shown that soft substrates, such as sand and mud, and the proximity to the salt front of tidally influenced rivers constitutes ideal forage conditions for Atlantic sturgeon (Bigelow and Schroeder 1953; Brunage and Meadows 1982; Johnson *et al.* 1997; Collins *et al.* 2000; Savoy and Pacileo 2003; Hatin *et al.* 2007; NMFS and USFWS 2007; Guilbard *et al.* 2007; Savoy 2007; Dzaugis 2013; McLean *et al.* 2013).

Atlantic sturgeon spawning and early life stages only occur in freshwater rivers. Early life stages and young of the year have limited tolerance to salinity and can tolerate salinity levels no more than 0.5 ppt. Early life stages and young of the year remain in the freshwater reaches of their natal river until reaching the sub adult stage when individuals have a higher tolerance for salinities between 0.5 ppt and 30 ppt. No spawning or early life stages of Atlantic sturgeon occur in the waters off of Narragansett Bay or along the vessel routes as the environment has a salinity higher than 0.5 ppt.

Sub adult and adult Atlantic sturgeon may be found in the action area year round as they migrate through or opportunistically feed. The action area is not a known aggregation area, and is not along a migration route to any spawning rivers, so we expect the presence of Atlantic sturgeon to be limited to rare, transient individuals.

Shortnose Sturgeon

Shortnose sturgeon occur in rivers and estuaries along the east coast of the U.S. and Canada (SSSRT 2010). There are 19 documented populations of shortnose sturgeon, with the population nearest to the action area occurring in the Connecticut River.

Shortnose sturgeon are benthic invertivores and feed mainly on benthic insects, crustaceans, mollusks, and polychaetes. Adult shortnose sturgeon gut content studies show that their diet typically consists of small bivalves, gastropods, polychaetes, and small benthic fishes (Dadswell *et al.* 1984, McCleave *et al.* 1977,

Dadswell 1979, Marchette and Smiley 1982, Moser and Ross 1995, Kynard et al. 2000, SSSRT 2010).

Within the Gulf of Maine, a portion of adults make seasonal migrations along the coast, traveling between the Penobscot, Kennebec and Merrimack rivers and making short stops in smaller coastal rivers along this route (Zydlewski et al. 2011). Outside the Gulf of Maine, marine migrations have only rarely been documented. Some shortnose sturgeon captured and/or tagged in the Connecticut River have been recaptured, detected, or were previously tagged in the Housatonic River (T. Savoy, CT DEP, pers. comm. 2015), the Hudson River (Savoy 2004), and the Merrimack River (M. Kieffer, USGS, pers. comm. 2015). At this time, the available tagging and tracking information is too limited to determine if Hudson River and Connecticut River shortnose sturgeon are making regular movements outside of their natal rivers and whether movement as far as the Merrimack River is a normal behavior.

As with the Atlantic sturgeon, spawning and early life stages of the shortnose sturgeon only occur in freshwater habitats. Therefore, no life stages besides salinity tolerant adults should occur in the action area. We expect shortnose sturgeon to overwinter in rivers, so their potential presence would be limited to April through November. In sum, it is possible that rare, transient, migrating or opportunistically feeding shortnose sturgeon may be present in the action area.

Effects Determination

Benthic Habitat

Effects to listed species can be caused by disturbance or loss of the sea floor that reduces the availability of prey species or alters the composition of forage. The action area has been shown to contain suitable habitat for multiple shellfish species, and consists of substrate that would support small benthic organisms. Both sea turtles and sturgeon could utilize the area opportunistically for foraging based on current conditions. It is not anticipated that any activities proposed as part of this project would alter the sea floor, reduce availability of prey species, or alter the composition of forage as all proposed anchors for the lines are part of existing moorings. The action area is known to have aquaculture leases on it. To the south of the aquaculture site there are three aquaculture sites in operation. To the north there is marina and to the south of the three leases there is a marina. The aquaculture sites and marina's all operate within a two mile area along the shore.

The actual footprint of the anchors and bottom cages will occupy an extremely small portion (4,000 square feet (0.11 acre)) of the 3 acre leased bottom and the larger action area which extends approximately 8 miles to Bristol Harbor. Therefore, habitat modification effects on the foraging behavior of listed species, specifically, the loss of foraging habitat from the installation of anchors and cages when added to the existing baseline conditions at the site, will be too small to be meaningfully measured or detected, and are insignificant.

Gear Interactions

The presence of longlines, trawl lines, vertical lines, floats/buoys, and other gear associated with the proposed project may pose an entanglement risk to ESA listed species that may be present in the action area while aquaculture gear is deployed. In sum there will be 20 horizontal lines and 50 vertical (20 for the trawl lines and 30 for the long lines). Lines within the water column and floats/buoys at the surface have the ability to wrap around flippers and fins of whales and sea turtles, specifically, while these species are

foraging or migrating in the mid to upper water column.

Entanglements are most likely to occur when the flippers or fins become wrapped in loose rope. The Proposed Special Conditions states that all lines will remain under tension at all tidal conditions. Additionally, sea turtle sightings are rare in Narragansett Bay. Another special condition will require the site to be attended three times a week to check the gear to ensure constant tension on all lines and to check for any interactions. Therefore, given the best available information, it is extremely unlikely that sea turtles will become entangled in the gear, and effects of gear interactions on sea turtles are discountable.

As described above, we are not aware of any fin whale sightings in Narragansett Bay, and we expect them to occur mainly in the 40-50 m depth contour, which is far deeper than the waters in the action area (2.7-3.4 m). Similarly, we looked at the last 15 years of right whale sightings data, and no right whales have been reported within Narragansett Bay and the action area. While these data rely on opportunistic sightings and reporting, the shallow depths and lack of known copepod aggregations in the action area further reduce the likelihood of right whale presence. Therefore, we expect listed whale presence in the action area and their interaction with the proposed gear to be extremely unlikely to occur, and effects to whales from gear interactions are discountable.

Both Atlantic sturgeon and shortnose sturgeon may be present in the action area. However the buoy lines and the horizontal mainline associated with the seaweed gear is not considered an entanglement risk to these species. This is in part because the gear and associated seaweed will be maintained in the upper half of the water column. Sturgeon, if present, will likely be foraging along the bottom where there are no lines other than the anchor. We also only expect rare, transient individuals of either species to be present, so interaction with the gear is unlikely. Thus, the presence of the gear, when added to existing baseline conditions, will not function as a potential impediment and any effects of the presence of gear on sturgeon passage are too small to be meaningfully measured or detected, therefore, insignificant.

Vessel Traffic

We have also considered the likelihood that an increase in vessel traffic related to the activities associated with the proposed project would generally increase the risk of interactions between ESA-listed species and vessels in the action area, in addition to baseline conditions. The proposed project will lead to a slight increase in vessel traffic.

The installation, monitoring, and harvest cycle will run all year with one vessel tending to the gear multiple times a week. The project duration is for a period of 10 years. As discussed above, we expect listed species presence to be limited to infrequent, transient individuals. The action area is part of Narragansett Bay where species can be more widely distributed and not concentrated in one area (e.g., the deeper waters of a navigation channel). If listed species do enter the action area, in adherence to the permit conditions, the applicant will ensure that the aquaculture vessel maintain a buffer of 150 feet for all listed species (1,500 feet for right whales) and all sightings will be reported to NOAA Fisheries. Therefore, any interaction between listed species and the single proposed 20 -25 feet project vessel transiting the action area at 10-15 knots is extremely unlikely to occur; we conclude that the effects of an increase in vessel traffic on listed species are discountable.

Conclusions

Based on the analysis that all effects of the proposed action when added to the baseline will be insignificant

and/or discountable, we have determined that the proposed Sugar Kelp and Atlantic oyster projects is not likely to adversely affect any listed species and will have no effect on critical habitat under NMFS' jurisdiction. We certify that we have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

Sincerely,

Taylor Bell
Project Manager
Regulatory Division

Literature Cited

- Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status Review of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). National Marine Fisheries Service. February 23, 2007. 188 pp. http://nero.noaa.gov/prot_res/CandidateSpeciesProgram/AtlSturgeonStatusReviewReport.pdf
- Bigelow, H.B., and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. Fisheries Bulletin, U.S. Fish and Wildlife Service 53, Washington, D.C.
- Brundage, H.M., and J.C. O'Herron. 2009. Investigations of juvenile shortnose and Atlantic sturgeons in the lower tidal Delaware River. Bull. N.J. Acad. Sci. 54 (2), pp 1-8.
- Dadswell, M.J. 1979. Biology and population characteristics of the shortnose sturgeon, *Acipenser brevirostrum* LeSueur 1818 (Osteichthyes: Acipenseridae), in the Saint John River estuary, New Brunswick, Canada. Canadian Journal of Zoology 57:2186-2210.
- Dadswell, M. J., B. D. Taubert, T. S. Squiers, D. Marchette, and J. Buckley. 1984. Synopsis of biological data on shortnose sturgeon, *Acipenser brevirostrum* LeSueur 1818. NOAA Technical Report NMFS 14 and FAO (Food and Agriculture Organization of the United Nations) Fisheries Synopsis 140.
- Damon-Randall, K., Colligan, M., and J. Crocker. 2012. Composition of Atlantic sturgeon in rivers, estuaries, and in marine waters (white paper). NOAA/NMFS, Gloucester, MA: Protected Resources Division.
- Endangered Species Maps. (2016). Retrieved from <http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html>
- Evans, N.T., *et al.* 2011. Recommended time of year restrictions for coastal alteration projects to protect marine fisheries resources in Massachusetts. Massachusetts Department of Marine Fisheries. New Bedford, MA.
- Guilbard, F., Munro, J., Dumont, P., Hatin, D., and R. Fortin. 2007. Feeding ecology of Atlantic sturgeon and lake sturgeon co-occurring in the St. Lawrence estuarine transition zone. In American Fisheries Society Symposium (Vol. 56, p. 85). American Fisheries Society.
- Kynard, B., M. Horgan, M. Kieffer, and D. Seibel. 2000. Habitats used by shortnose sturgeon in two Massachusetts rivers, with notes on estuarine Atlantic sturgeon: a hierarchical approach. Transactions of the American Fisheries Society 129: 487- 503.
- "Long Island Sound By the Numbers." *Long Island Sound Study*. n.p., 2017. Web. 4/18/2017. <<http://longislandsoundstudy.net/about-the-sound/by-the-numbers/>>.
- Marchette, D.E., and R. Smiley. 1982. Biology and life history of incidentally captured shortnose sturgeon, *Acipenser brevirostrum*, in South Carolina. Report of South Carolina Wildlife and Marine Resources 57pp.
- McCleave, J.D., S.M. Fried and A.K. Towt. 1977. Daily movements of shortnose sturgeon,

Acipenser brevirostrum, in a Maine estuary. *Copeia* 1977:149-157.

Morreale, S.J. 1999. Oceanic migrations of sea turtles. PhD Thesis. Cornell University. 2003. Assessing health, status, and trends in Northeastern sea turtle populations. Interim report: Sept. 2002-Nov. 2003.

Morreale, S.J. and E.A. Standora. 2005. Western North Atlantic waters: Crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. *Chel. Conserv. Biol.* 4(4):872-882.

Moser, M.L. and S.W. Ross. 1995. Habitat use and movements of shortnose and Atlantic sturgeons in the lower Cape Fear River, North Carolina. *Transactions of the American Fisheries Society* 124:225-234.

National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS). 1998. Status review of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and United States Fish and Wildlife Service. 126 pp. National Oceanic and Atmospheric Administration. 2016. Endangered and threatened species; critical habitat for the endangered north Atlantic right whale. 81 FR 4837. Washington, D.C., Federal Register.

"Protected Species Branch." *National Oceanic and Atmospheric Administration*, NOAA Fisheries, 1 June 2016, www.nefsc.noaa.gov/psb/

Savoy, T. and D. Pacileo. 2003. Movements and important habitats of subadult Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) in Connecticut waters. *Transactions of the American Fisheries Society* 132: 1-8.

Shoop, C.R. and R.D. Kenney. 1992. Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. *Herpetological Monographs* 6: 43-67.

SSSRT (Shortnose Sturgeon Status Review Team). (2010). A Biological Assessment of shortnose sturgeon (*Acipenser brevirostrum*). Report to National Marine Fisheries Service, Northeast Regional Office. November 1, 2010. 417 pp.

USGS. *USGS*. n.p., n.d. Web. 4/18/2017. <<https://pubs.usgs.gov/of/1998/of98-502/chapt4/rz7capt.htm>>.

Zydlewski, G.B., M.T. Kinnison, P.E. Dionne, J. Zydlewski, and G.S. Wippelhauser (2011). Shortnose sturgeon use small coastal rivers: the importance of habitat connectivity. *Journal of Applied Ichthyology* 27:41-44.